

Papilio Comma, *Scopoli, Carn. No. 463 (1763).*

Papilio Melicerta, *Bergstr. Nomencl. t. 90. f. 1-4 (1779-80).*

Europe, England.

Remarks on the Cranial and Dental Characters of the existing Species of *Hyæna*. By GEORGE BUSK, Esq., F.R.S., Sec. L.S.

[Read May 3, 1866.]

THE following observations refer more especially to two points concerning which considerable doubt and confusion have hitherto existed.

(1.) Three, or, as some zoologists have supposed, four species of the genus *Hyæna* are at present in existence; and it is probable that palæontology is acquainted with at least three, and perhaps more, extinct forms. It is not my intention here to advert further to the fossil species than to state that, like the existing ones, they fall into two very natural groups of subgeneric value, and that with respect to some among them it has hitherto been found very difficult, and in some cases impossible, to distinguish them from their existing representatives.

The existing or supposed species of *Hyæna* are:—

1. *HYÆNA STRIATA*, *Zimmerman*.

H. orientalis, *Tiedemann*.

H. vulgaris, *Desmarest*.

H. fasciata, *Thunberg*.

H. antiquorum, *Temminck*.

H. veterum, *Kæmpfer (Amœn. Exotic. 1712, p. 411).*

Canis Hyæna, *Linn., Erxleben, &c. (Syst. Anim. 1777).*

Lupus marinus, *Gesner*.

Hyène rayée, *Cuvier*.

Striped Hyena, *Pennant*.

2. *H. BRUNNEA*, *Thunberg (Vetensk. Acad. Handl. 1820, p. 59).*

H. fusca, *G. St. Hilaire*.

H. villosa, *Smith (Linn. Trans. xv. 1827, p. 462).*

Hyène dont la patrie est inconnue, *Cuvier, Oss. fossil. 4th ed. 1835, viii. p. 318.*

The Strand Wolf of the Cape.

3. *H. CROCUTA*, *Erxleben (sp.), Syst. Règne Animal, 1777, p. 575.*

H. maculata, *Thunberg (non Ödmann).*

H. capensis, *Desmarest*.

Canis crocuta, *Erxleben*.

Crocuta maculata, *Kaup (Isis, 1828, p. 1144).*

Hyæna sive congener illi Crocuta, *Ludolf*. (*Hist. Æthiop.* l. i. c. 10).

The Spotted Hyena, *Pennant*.

The Tiger Wolf of the Cape.

4. H. MACULATA, *Ödmann* (*Vetensk. Acad. Handl.* xi. 1, 1820, p. 65).

The first two of these species are distinguished by certain well-marked dental characters, and have on that account and from other peculiarities (according to Kaup, the possession of the anal sacculus) been placed by some zoologists in a distinct genus or subgenus, for which the late Dr. Falconer had proposed to employ the term *Euhyæna*; and, in like manner the last species or last two species, constitute the subgenus, or genus, as some regard it, of *Crocuta*, first so named by Kaup. And to this group belongs the commonest form of fossil or Cave Hyena, *H. spelæa*.

The remarks here offered are intended, in the first place, to point out the distinction that may be drawn from the cranial and dental characters alone, between *H. striata* and *H. brunnea*; and secondly, to inquire what evidence is afforded by those characters, in favour of or against the supposition that there is more than one distinct form of "Spotted Hyena."

It might be thought that there is little reason or use in entering into a critical examination of such a limited range of parts, concerning the distinctive characters of two such well-marked and undoubted species as *H. striata* and *H. brunnea*. For the mere purpose of distinguishing these forms zoologically, there are, it is quite true, abundant materials in other striking and obvious characters; but when we come to the distinction of species by the bones alone, and more especially to that of the fossil species, and their relationship to existing forms, it becomes a question of the utmost interest to ascertain as precisely as possible the characters derived from the more imperishable and most frequently met with parts of the frame, amongst which the cranium and teeth are perhaps the most important.

With reference to this, and to show how much the importance of such an inquiry has been felt by palæontologists, I will quote some remarks which I find in the notes of the late Dr. Falconer on the subject of the fossil Hyena from the bone breccia of Gibraltar, to the study of which he had devoted a great amount of labour. He says, "It has been long known to palæontologists that remains of fossil Hyenas specifically distinct from *H. spelæa* abound in the ossiferous caves of the South of France. Latterly they have been detected under similar circumstances in Sicily. But the opinions entertained respecting the specific determination

of these fossil forms and their relations to existing Hyenas have been very conflicting. Much of this uncertainty has doubtless arisen from the imperfect nature of the materials which have come before the different observers; but we believe that it has in a considerable measure been owing to the unsettled opinions among zoologists respecting the number and affinities of the living species, and to the imperfect state of knowledge regarding their osteological distinctive characters, more especially in what relates to the form of the cranium and teeth." He then proceeds to observe, "We shall endeavour before entering upon the description of the Gibraltar fossil form to determine what the osteological distinctions of the living species are." And it is very deeply to be lamented that he did not live to carry out this useful design, towards which the present remarks may be regarded as a contribution.

(2.) But before proceeding to the description of the differences between *H. striata* and *H. brunnea*, I should wish to be allowed to say a few words on the circumstances which have more immediately led to the confusion which exists with respect to *H. brunnea*, at any rate among English palæontologists. As an instance of this it may be stated that Dr. Falconer, than whom no man justly stands higher as an authority in Mammalian Palæontology and Osteology, and my friend Mr. Boyd Dawkins, who bids fair to become his worthy successor, have both assigned to *H. brunnea* three crania which most indubitably do not belong to that species, nor even to the same subgenus, and in consequence of this mistake have been induced to regard *H. spelæa* as closely allied to if not identical with the "Strand Wolf" of the Cape of Good Hope; and I may add that I was myself also naturally led to the same conclusion. The way in which such competent observers as Dr. Falconer and Mr. Boyd Dawkins were led into this error, may, however, be very simply explained.

The only materials, so far as I know, publicly available in London for the study of the osteology of the cranium of the *Hyæna* are to be found in the British Museum and in the Royal College of Surgeons.

In the former place they comprised, until lately, (1.) two skulls of *H. crocuta*, numbered 1232 (*a*) and 1232 (*b*), and another so named in the Palæontological Gallery, numbered 37783; (2.) two skulls, one a good deal broken, named *H. brunnea*, and numbered respectively 822 (*a*) and 822 (*b*); and (3.) a good many skulls of *H. striata*.

In the Museum of the Royal College of Surgeons the materials afforded are (1.) a very fine cranium with the teeth in beautiful condition, named *H. crocuta*, and numbered 4447; (2.) a skull belonging to the entire skeleton of a "Spotted Hyena," which when alive was in the possession of the late Dr. Buckland; and (3.) several crania of *H. striata*.

With respect to the Striped Hyena of course no question could arise; and with respect to the others, as there appeared to be no reason to doubt the correctness of the appellations bestowed upon them, it was naturally assumed that the two crania named *H. brunnea* in the British Museum afforded types of that species. And indeed, as will afterwards appear, upon comparison of these two crania with those of undoubted specimens of *Hyæna crocuta* in the same collection, sufficient differences are at first sight apparent between them to justify any one, in the absence of direct testimony to the contrary, in supposing that they belonged to distinct species. An additional piece of evidence was also believed to be forthcoming, which would have been conclusive as to the point to which species these crania belonged, inasmuch as in the Catalogue an asterisk prefixed to one of them was taken to imply that the stuffed skin of the animal was also in the national collection. Upon comparison again of these two specimens with that numbered 4447 in the Royal College of Surgeons, which was widely different from the cranium belonging to Dr. Buckland's specimen of *H. crocuta*, the characters of the three, allowing for differences of age, &c., were so similar that Dr. Falconer was persuaded that they all three belonged to one and the same species, and that that species was closely allied to if not identical with the fossil Hyena from Gibraltar, and, in all probability, also with *H. spelæa*. He therefore was led to the conclusion that the "Strand Wolf" of South Africa had at one time extended as far North as Gibraltar at least, if indeed it had not at a still remoter period abounded in far more distant northern latitudes. Biassed no doubt by the weight of Dr. Falconer's opinion, Mr. Boyd Dawkins, in his valuable paper on the Dentition of *Hyæna spelæa**, adopted the same view; and, as I have said, it appeared to me also an inevitable conclusion from the premises. No mistake, however, could be greater, or, in a palæontological sense, attended with more important consequences.

Unable to reconcile Mr. Boyd Dawkins's account of the supposed *H. brunnea*, taken from the specimens 822 (b) in the Bri-

* Nat. Hist. Review. No. XVII. p. 80, Jan. 1865.

tish Museum, and 4447 in the College of Surgeons, with what he himself had always regarded as *H. brunnea* or *fusca*, M. Lartet, on the occasion of my being about to visit Paris a short time since, requested me to bring him casts of the dentition of the two specimens in question. Time however only allowed me to procure that of the College of Surgeons specimen. Comparison of this with specimens of *H. crocuta*, *H. striata*, and the true *H. brunnea* in M. Lartet's possession, showed at once that it belonged to the first-named species, or at any rate to the same type, and that it had nothing in common with *H. brunnea*, except perhaps its size. It was from this further evident also that we had no known specimen of that species either in the British Museum or the College of Surgeons. Under these circumstances on my return to London bringing with me an excellent cast of the dentition of *H. brunnea*, I took the first opportunity of making a close examination and comparison of the various Hyæna-crania to which I had access. The comparison of the so-termed *Hyæna-brunnea* skulls in the British Museum with those named *H. crocuta* in the same collection, soon satisfied me that there was no essential difference between them sufficient to justify their specific distinction. On further inquiry it also appeared that there was no stuffed skin belonging to either of the crania assigned to *H. brunnea*; nor was I able to learn from Dr. Gray that there were any grounds for attributing them to that species, beyond the circumstance that they had been purchased as such at Mr. Warwick's sale. As they really appeared to differ very considerably from the other two skulls which were certainly known to belong to the "Spotted Hyæna," and as no materials were at hand for comparison, no suspicion appears ever to have been entertained that they were misnamed. But in consequence of this absence of any proof that they belonged to *H. brunnea*, and in the presence of their absolute distinctness from that species as exemplified in the cast I had brought from Paris, the conclusion appeared inevitable that the name under which they had been entered in the Catalogue was erroneous. Had any doubt, however, remained on this point, it would have been removed when Mr. Gerrard produced a skin of the veritable *H. brunnea*, containing the skull. But on examination of this specimen it appeared that the bones had been detached from the skin, and then sewn up again in it. When removed it appeared that they had been cleaned; and the name of *H. brunnea* (*sic*) was written on both the cranium and the mandible, which latter, however, was found to belong to another in-

dividual, of smaller size. This circumstance naturally led to the surmise that both the cranium and jaw might both have been substituted for those really appertaining to the hide; but on examination it was clear enough that the latter fitted too exactly to the upper jaw and cranium to admit of any doubt of their belonging to each other. The introduction of a smaller lower jaw of the same species is a curious circumstance, but of no immediate importance.

Comparison of the dentition of these two jaws with the cast of that of *H. brunnea* proved at once that they were identical, and it was thus shown that the national collection was really in possession of a skull of *H. brunnea*. I am happy to say also that Dr. Gray, with his accustomed zeal in the cause of science, has procured from Paris an excellent specimen of the entire cranium of that species, which he has kindly allowed to be exhibited on the present occasion*.

(3.) After this little historical episode, which will serve at any rate to point out the necessity of the utmost caution in doubtful cases, and of the danger of taking anything for granted, I shall proceed to indicate as briefly as I can the chief distinguishing characteristics between *H. brunnea* and *H. striata*, the only existing species with which it can possibly be confounded. But that it can be so confounded, and that by the very ablest observers, will be apparent when it is stated that M. de Blainville, who has given such an excellent figure of the head and teeth of *H. brunnea* in his 'Osteography,' observes that it is impossible to distinguish one from the other by the cranial characters, and consequently is disposed to consider *H. brunnea* only a variety of *H. striata*. And, again, Dr. Falconer, in noticing the actual specimen in the Museum of the Jardin des Plantes from which De Blainville's figure was taken, says with respect to it "that the famous *Hyæna fusca* of Caffraria, brought in 1839 by M. Forestier, and figured by De Blainville, is a true *Euhyæna*, the skull differing in no respect from the skulls of *H. striata*, except in being somewhat larger;" but the "teeth," he says, "differ in this important respect, that the last molar in the lower jaw has not the posterior cusp with an additional cusp developed inside. There is only an adpressed rudiment barely distinguishable. The talon also, though of the same form, is less developed on its crown surface. This tooth on

* I am also able to add that, since this paper was read, the Royal College of Surgeons has procured two excellent crania of *H. brunnea*, the additional materials afforded by which I have incorporated in the text and in the Tables.

the whole approaches in form more that of the *Crocottas*. The carnassier of the upper jaw has three subequal lobes, exactly as in *Hyæna striata*; and the last or tubercular is exactly alike; the last lobe of the carnassier is less indented in *H. fusca*. This, then," he remarks, "is the true *H. fusca* of E. and G. St. Hilaire."

A subsequent note, also made in the Jardin des Plantes, shows how much he was puzzled about *H. brunnea*, as well he might be; and again on the occasion of a visit to examine the Hyæna-skulls in the British Museum, he writes, "Examined the two skulls, *H. crocuta* and *brunnea*. Gray, Cat. p. 69, cites *H. fusca* as a synonym; but this is a mistake;" and he ends the note by saying that he "believes there are four species living, viz. :—

H. crocotta or *maculata*.

H. brunnea.

H. (Euhyæna) fusca.

H. (Euhyæna) striata."

I make these quotations from the brief notes of my lamented friend, not only to show how confused the subject of the different existing species of *Hyæna* was in his mind, and consequently how useful it would be to have it definitively settled for succeeding palæontologists, but also because I am unwilling that anything which can be rescued from his notes should be lost. In the quotation above given it will be seen that his keen and penetrating eye had really perceived the more essential among the dental characters distinguishing *H. striata* from *H. brunnea*, although, from the mistake with regard to the latter species into which he had almost inevitably been led, he, like De Blainville, overlooked the true significance of what he had noticed.

H. striata and *H. brunnea*, so far as regards cranial and dental characters, agree in so many particulars as upon superficial inspection to be readily confounded. The chief points in which they agree are also those in which they both differ from *H. crocuta* and its fossil congeners.

1. In both, the upper tubercular molar is triradicular and tricuspid, and rarely less than 0·5 of an inch in length by 0·2 in its shorter diameter; while in *H. crocuta* and its allies this tooth is normally biradicular and bicuspid, though not unfrequently, by abortion, uniradicular, or entirely absent; and it is never more than 0·2 or 0·21 in length by 0·1 in the shorter diameter.

2. In having the three lobes of the upper carnassial tooth subequal in the antero-posterior direction.

3. In having a more or less distinct accessory point on the inner side of the hinder cusp of the lower carnassial tooth. It is true that a minute tubercle, or rudiment, rather, of a similar point is not unfrequently seen in nearly the same situation in *H. crocuta*, and perhaps still more frequently in *H. spelæa*. But in these species it never assumes anything like the size it presents in *H. striata* and *H. brunnea*, though it is considerably less in the latter species than in the former. Some difference also may be noticed in the exact situation of the accessory point in *H. crocuta* and *spelæa*, in which species it is usually situated as it were in a hollow beneath the base at the inner and hinder border of the posterior cusp; whilst in *H. striata* and *brunnea* it rises distinctly on the inner face of the cusp.

Other points of agreement between the two Euhyænas may be noticed—as for instance the presence in both of a distinct anterior talon to the 2nd premolar, and of a well-defined anterior talon to the 1st, 2nd and 3rd premolars, which is larger, however, as are all the talons in fact, in *H. striata*. In *H. striata* and *H. brunnea*, the 2nd and 3rd premolars are placed with their long axis oblique to the line of the alveolar border, and the 3rd premolar is obliquely truncated behind, whilst in *H. crocuta* this tooth is square behind.

The opening of the nares is rounded in *H. crocuta*, and more or less pyriform in *H. striata* and *H. brunnea*, in which also the anterior palatine foramina are very much larger in proportion. Other minor points might be noticed; but the above are abundantly sufficient to indicate the affinity of *H. striata* and *H. brunnea*, and their common distinction from the *crocuta*-group.

Having thus pointed out the more important particulars in which *H. striata* and *H. brunnea* agree, it remains to indicate those in which the difference between them is chiefly shown. So far as the general dimensions of the cranium are concerned, it may be said that, whilst the average length (extreme) of the cranium, measured from the incisive border in front to the point of the sagittal crest behind, appears to be greater in *H. brunnea* (1011 to 904)*, in regard to the zygomatic width the preponderance is greatly in favour of *H. brunnea*, in which this width is on

* It should be stated, however, that these numbers are taken only from my own measurements, according to which the maximum length of the cranium in *H. striata* is 950, but that M. de Blainville gives the maximum for that species at 1070. But this difference may perhaps be due to the circumstance that he has included a specimen of *H. fusca* under that appellation.

the average 644—and in *H. striata* 590, in which species the maximum is 650, and minimum 510, whilst the corresponding numbers in *H. brunnea* are 680, 570. Another particular in which the two species differ is in the interorbital width, which is considerably greater in *H. brunnea* (206 to 181), the maximum and minimum being in *H. striata* 200 and 165, and in *H. brunnea* 215 and 190. The occipital condyles also, measured from outside to outside, show a width of 159 in *H. striata*, and of 200 in *H. brunnea*. In the height of the orbit the two species are pretty nearly alike, and both have it considerably less than *H. crocuta*. The nasals are smaller in *H. striata* than in *H. brunnea*, in which species those bones are larger even than in *H. crocuta*. Passing to the maxilla we find that the width measured from the outside of the 3rd premolars is in *H. striata* 308, and in *H. brunnea* 350 (the maximum in the former species being 335, and in the latter 380), whilst the least transverse measure of the upper jaw in *H. striata* is 198, and in *H. brunnea* 221, showing that in the latter case it is rather more constricted in front. Again, passing on to the teeth, the length of the upper incisor series in *H. striata* is on the average 127, and in *H. brunnea* 139; but when looking to the maximum and minimum in each case, it will be seen that no very great difference in this particular really exists. With respect to the length of the molar series, however, it is widely different; the mean figure for this in *H. striata* is 271, and in *H. brunnea* 312—the respective maxima being 285 and 320.

As regards the individual teeth, those in which the greatest differences are perceptible are the 3rd incisor, the canine, the 3rd premolar, and the 4th premolar, the last two exhibiting considerably greater dimensions in *H. brunnea*.

In the mandible a corresponding want of size will be found in *H. striata*, the maximum length of the jaw, measured from the back of the condyle to the incisive border in front, being in that species 660, and in *H. brunnea* 740—the condyle in the former case measuring 145, and in the latter 170 in transverse diameter. And the other dimensions of the mandible are in agreement with these, as will be seen from the Table.

As to the teeth, the lower incisor series is of about the same length in both species; but the molar series, as a matter of course, corresponds with that of the upper jaw in its greater length in *H. brunnea* (309 to 268, or in the maximum, 320 to 288). The third incisors are about equal, but the canine is considerably larger in *H. brunnea*—the maximum size of that tooth in *H. striata* being

60 × 40, and in the other 75 × 50, equalling in fact the size of this tooth in *H. crocuta* *. All the other teeth are also considerably larger in *H. brunnea*; but the greatest differences are observable in the 2nd and 3rd premolars and in the molar. And with respect to the proportionate size of these teeth a remarkable distinction will be seen to exist. Whilst in *H. striata* the mean relative dimensions of the teeth stated in the above order, are 72 × 44, 78 × 43, and 81 × 40, the corresponding sizes in *H. brunnea* are 84 × 55, 94 × 53, and 94 × 50. These figures show not only that the three principal teeth in the molar series are a good deal smaller in *H. striata*, but also that in that species the last or molar tooth is larger than the penultimate, and that the other two are not very greatly different in size; whilst in *H. brunnea* the ultimate tooth is rather less than the penultimate, which, again, is a good deal bigger than the antepenultimate—differences in which it will be seen in the Tables that *H. brunnea* approaches *H. crocuta* and *H. spelæa*.

Having thus indicated the principal differences in dimensions between *H. striata* and *brunnea*, if we proceed to the differences in form, &c., of certain parts of the cranium and of some of the teeth, we shall find equally well-marked distinctions between the two species. Commencing with the cranium, it may be remarked that although in general form the brain-case does not differ very much, yet that it is on the whole more compressed in *H. brunnea*; and especially is this visible in the alisphenoid region, where, in both *H. crocuta* and *H. striata*, the sides of the cranium project abruptly, which is not the case in *H. brunnea*. A difference in the form of the occipital triangle will also be noticed. In *H. striata* as in *H. crocuta*, the lateral ridges by which it is bounded, or the superior occipital ridges, about an inch or an inch and a half below the point of the sagittal spine bend outwards, whilst in *H. brunnea* they descend to the mastoid almost in a continuous even line very slightly convex outwardly (figs. 4, 5); and they are also much more prominent in *H. striata*. The upper border of the sagittal crest is more arched in *H. brunnea*. In *H. striata* the nasals reach almost if not quite to the level of the highest point of the fronto-maxillary suture, whilst in *H. brunnea* they terminate nearly half an inch below it. The infraorbital foramen is larger in *H. brunnea* (0·55 to 0·45†). The width of the zygoma, as before remarked,

* *H. brunnea* is distinguished not only from *H. striata*, but also from *H. crocuta* and *H. spelæa*, by its having the lower canine larger than the upper.

† Probably commensurate with the greater size and abundance of the tactile vibrissæ in that species.

is rather greater in *H. brunnea*; but the zygoma itself is much broader in the vertical direction, and at the same time more hollowed out on the inner aspect. The lower border of the orbit is thicker, and, as it were, more everted in *H. striata*. The auditory opening is larger in *H. brunnea*. The tympanic bulla is rather larger in proportion to the mastoid process in *H. striata*, but of much the same form, otherwise, as in *H. brunnea*; but the posterior vertical border or angle of the mastoid process, forming the continuation of the lateral occipital ridge, is concave or at any rate straight in *H. brunnea*, and convex in *H. striata*, in which species also the point of the mastoid process is much slenderer. The pterygoid gutter is much wider in *H. brunnea*. The form of the palato-maxillary suture is alike in both; and the length and breadth of the palatals are pretty nearly equal, but are rather wider, however, in the latter species.

In *H. brunnea* the lower border of the horizontal ramus of the mandible is much more convex; the coronoid process longer and more reclined, arching backwards, in fact, beyond the condyle, whilst in *H. striata* it is greatly in front of it; and in *H. brunnea* the anterior border of the coronoid process on the outer surface projects into a high sharp ridge with a deep concavity behind it, which is altogether wanting in *H. striata*. The angular crochet is much broader and shorter and more upturned in *H. brunnea*. As has been before noticed, the mandibular condyle is much wider in *H. brunnea*. The dental foramen is small and rounded in *H. striata*, larger and elongated in a vertical direction in *H. brunnea*. The mandible generally is thicker or more robust in *H. brunnea*.

In the individual teeth we may remark that in the maxilla, besides the differences in dimensions which have already been adverted to, considerable differences in form will be apparent. The tubercle of the carnassial is larger and more rounded or bombé in *H. brunnea*. The anterior talons of the 2nd premolar and of the 3rd premolar are much more developed in *H. striata*. The canines and incisors are very much alike, except that the former are larger in *H. brunnea*, and the tubercular molars are indistinguishable. In the mandible the incisors are more in advance of the canines in *H. striata*. The anterior talons of the 2nd and 3rd premolars, as in the maxilla, are very much more distinctly developed in *H. striata*.

From what has been said, it will be apparent that the distinctions between the cranial and dental characters of *H. striata* and *H. brunnea* are in themselves sufficiently well marked to enable us, where the characters are ascertainable, readily to distinguish

between these two species. The principal points, as it seems to me, to which attention should be directed, are:—

1. The form of the cranium.
2. The shape of the occipital triangle.
3. The width of the condyles.
4. The width of the pterygoid gutter.
5. The expansion and breadth of the zygomatic arch and of the zygoma.
6. The size and proportion and form of the teeth, and more especially of the upper and lower carnassials, and of the upper and lower 2nd and 3rd premolars and canines. The relative size of these two teeth and the proportionate degree of development of their anterior talons are of all characters the most striking and the most readily available.

(4.) With the objects I had in view in drawing up these observations, I have thought it unnecessary to indicate all the secondary points in which *H. brunnea* differs from *H. crocuta*. No one can have any difficulty in distinguishing them; and all the information I can afford, so far as comparative measurements are concerned, will be found in the Tables accompanying this paper. I shall therefore merely offer a few observations on the subject of the existence of two distinct forms of “Spotted Hyena,” as evidenced in the cranial and dental characters. But before entering upon that subject I may be allowed to say a few words with respect to the opinions that have been published regarding the existence of two kinds of “Spotted Hyena.”

Pennant, who was the first to lay down, in 1771, the generic distinction between *Canis* and *Hyæna*, was also the first clearly to describe a second species of the latter genus under the name of “Spotted Hyena,” taking his description, as he says, from a living specimen which had been exhibited in London a few years before. In 1777 Erxleben*, though still arranging *Hyæna* under the Linnæan genus *Canis*, adopts Pennant’s “Spotted Hyena” as a species, and translating his description into Latin, gives the species the name of *Canis crocuta*, citing as synonyms the “*Hyæna, sive congener illi Crocuta*,” of Ludolphus, *Æthiop. lib. i. c. 10, p. 50*; and the Quamberg of Barbot, *Guin. p. 86*, and the Jackals or Boshund of Bossman, *Travels in Guinea, p. 291, &c.* Amongst the characters of this West African species, he gives “*cauda brevis, nigra, villosa*.” In a brief communication in Oken’s “*Isis*” for 1828, p. 1144, Kaup observes that the common and the spotted Hyenas differ so widely that they may very properly be

* *Systema Regni animalis, &c. Lipsiæ, 1777, p. 575.*

regarded as the types of two distinct genera, which bear the same relation to each other as do the Linnæan subgenera or (as he would himself regard them) genera of *Civetta* and *Genetta*. He instances among other particulars in which these genera may be said to present analogous characters, the presence in *Civetta* and the absence in *Genetta* of the anal follicle, as well as the possession by the former genus of an erectile mane, and of stripes, &c., in which it resembles the "Striped Hyena;" whilst the spotted fur of *Genetta* and the absence of an anal pouch and of a mane would point out the analogy between that genus and that of *Crocuta**. He consequently regards Pennant's genus Hyena as a family containing two genera *Hyæna* and *Crocuta*, with respect to the latter of which he says, "Two species can with certainty be referred to this genus, both of which must have lived in Europe. One species still lives in Africa, and this the *H. crocuta*." Under these two species of *Crocuta* it is obvious that Kaup included *H. spelæa* as the one which formerly inhabited Europe. And it is clear that he recognized only one species of the genus besides this.

Cuvier† observes that there are two varieties pretty well marked, if not species, among the spotted Hyenas. "Some," he says, "are of a whitish grey approaching tawny, and have brown spots, round and well defined, on the flanks and thighs; those on the shoulder form a band which is continuous with a longitudinal brown line on each side of the neck; the feet are whitish, tinged with red towards the bottom; the tail is ringed with white and brown at the base, and blackish in its lower two-thirds; the head, of the same general colour as the back, presents a little brown towards the cheeks, and of red towards the vertex.

"Other spotted Hyenas have a denser coat, of a decided reddish grey; the underside of the neck and of the body, only, whitish; the blackish spots, which are ill defined, occupy the sides, the haunches, and the thighs, and a blackish band is also visible on each side of the neck; the legs and feet are blackish; but the inner side of the fore legs is reddish white; the tail is of a rusty brown colour for its first half, and blackish for the rest of its length. The head is reddish, blackish in front and between the eyes; the lower part of the forehead rusty brown." "This variety," he says, "is common round the Cape."

* Having lately examined a living *H. crocuta* in the Zoological Gardens, I can confirm Kaup's statement that no trace of a pouch between the root of the tail and the anus exists, at any rate in the male of that species.

† *L. c.* p. 319.

In a Paper under the title of "Tillägg om Slägtet Hyæna," or "Supplement respecting the genus *Hyæna*," which seems to have been intended as an Appendix to Thunberg's immediately preceding paper, in which *H. brunnea* is described, S. Ödmann enumerates four existing species of *Hyæna*, viz. :—

1. *Hyæna fasciata*.
2. *H. crocuta*.
3. *H. maculata*.
4. *H. brunnea*.

The distinctive characters he gives of *H. crocuta* and *H. maculata* are :—

1. *H. crocuta*, rufo-fusca, maculis triquetris vel oblongis, nigris, cauda elongata.

And the synonyms he assigns to it are :—

Crocuta (sive) "congener Hyæna," Ludolphus, Hist. Æthiop. L. 1. cap. 10. § 51.

Canis crocuta, Schreber.

2. *H. maculata*, ferrugineo-fusca, maculis distinctis nigris, cauda brevi.

Syn. Pennant's "Spotted Hyena."

The Tiger Wolf of the Cape Colonists, &c.

The principal grounds adduced by Ödmann in favour of this distinction between the two forms of "Spotted Hyena" appear to be derived from the description given of it by Schreber*, who, at first having doubted whether Pennant's "Spotted Hyena" was more than a variety of *H. striata*, was afterwards satisfied of the contrary by the receipt of a drawing accompanied with a description taken from a living specimen of a "Spotted Hyena." But this drawing and description differed in the points above indicated from the figure and description given by Pennant; and as both are said to have been described and figured from nature, Ödmann conceived that it was impossible two such dissimilar animals should belong to the same species. I have not, however, as yet met with any zoologist who is acquainted with a long-tailed "Spotted Hyena;" and with respect to the shape of the spots and the varying tints of colour, these characters would not seem sufficient in the absence of more fixed ones to justify us in making two species out of *Hyæna crocuta*. And with reference to this I may state that there are at the present time four living Hyenas in the gardens of the Zoological

* Säugethiere, T. iii. p. 374. tab. xcvi. B, *Canis crocuta*.

Society, viz.:—*H. striata*, *H. brunnea*, and two specimens of *H. crocuta*, one from South Africa, and the other, a more recent acquisition, from the west coast of Africa. I have attentively observed these two animals, which are both males, though doubtless of different ages, and am unable to perceive any difference between them, except in colour. The one from South Africa is generally much darker-coloured and browner, especially on the back and legs, and, owing perhaps to this universal darker hue, the spots are not so well defined as they are in his neighbour; and they appear to me to be rather smaller and less angular in outline than in the specimen from the West Coast. The hair also is somewhat longer, especially on the ears, in the South African form. But in the shape and size of the ears, and in general habit and stature, there is no difference whatever between the two animals. In both the tail is equally short, although the West African Hyena in this instance seems to have the habit of carrying his caudal appendage turned up. The animals are clearly of the same species.

There are no sufficient grounds, therefore, as it seems to me, at present for believing that Schreber's long-tailed Hyena was more than an instance of an individual peculiarity, even if its length of tail were not due merely to inadvertence on the part of the draughtsman. We have still therefore to seek for further evidence of a more decided nature to determine the question of the number of species or well-marked varieties of "Spotted Hyena." Having no other materials for the purpose, I have sought for this evidence in the cranium and teeth, with the results I am about briefly to detail.

I have already stated that the British Museum collection contains five crania belonging to the subgenus *Crocuta*. But of these, two, viz. nos. 1232*a* and 1232*b*, differ so widely at first sight from the others, and more especially from those numbered 822*a* and 822*b*, as even after considerable study to have led excellent observers to conclude that they belonged to distinct species. A third cranium, presenting exactly similar characters to nos. 1232*a* and 1232*b*, exists in the Hunterian Museum. It forms part of the skeleton of the *Hyæna crocuta* formerly in the possession of the late Dr. Buckland (No. 4446, R. C. S.).

For convenience I propose to denote these three crania as *H. crocuta*, A, and the other two as *H. crocuta*, B; and the comparative measurements of the two forms will be found in columns II. and V. of Table V. Inspection of the figures in these columns

will show—1. that in the form A the length of the cranium is much less than in the other—that is to say, in the proportion of 993 to 1090; 2. that the zygomatic width is also less, in the proportion of 703 to 715; and in fact that all the other cranial measurements are less, except the interorbital width, which in form A exceeds that of the other in the proportion of 240 to 225. In the maxilla we find a very remarkable difference in the length of the palate, which in the form A is represented by 470, whilst in B it amounts to 550, and that the length of the palatals is in the former case 199, and in the latter 240*. These figures show that the length of the upper jaw is considerably greater in form B; but when we come to the width, the same difference does not obtain, the transverse diameter of the maxilla, both at the 1st premolar and at the 3rd premolar, being exactly the same in both cases. And the same thing is apparent in the dimensions of the incisor and of the molar series—the former being absolutely wider in A, in the proportion of 165 to 150, whilst the latter series of teeth measures in it only 310, and in B 335. We perceive therefore that the maxilla in form A is, as compared with the other, disproportionately short and wide. On comparing the individual teeth, even more important differences in dimensions are found to exist. The 3rd incisor, notwithstanding the greater length of the incisor series, is considerably smaller in form A than the corresponding tooth in the other form, or in the proportion of 46×35 to 60×40 . The same disproportion is found in the canine, and in even a still greater ratio in the remaining teeth, and especially in the 3rd and 4th premolars. In the 3rd premolar the difference may be expressed by the figures 71×60 and 100×70 , and in the 4th premolar by 130×44 and 150×85 .

Corresponding differences, as may be supposed, exist in the mandible and its teeth. The only dimensions in which the lower jaw in the form A exceeds the other are its height under the molar, expressed by the figures 174 and 170, its width at the 2nd premolar (302 and 300), and the length of the incisor series (125 and 120). We see therefore in this jaw as well as in the maxilla a disproportionate width in comparison to its other dimensions, as will be more clearly seen on reference to the Table. The much smaller dimensions of the teeth are even more strongly marked in the mandibular than in the maxillary teeth; as an instance, I would notice the comparative numbers standing opposite the molar, viz. 106×46 and 120×52 .

* But there is reason to believe that the length in this case is exceptional.

The above statement, together with the figures given in the Table, is sufficient to show that there is every excuse to be made for those who upon comparison of the two crania 1232 *a* and 1232 *b* in the British Museum with those of the B form, numbered 822 *a* and 822 *b*, should have regarded them as specifically distinct. But the two latter specimens might be exceptional, and it was necessary to compare them with others bearing the same general type, but of less dimensions and of younger age. Fortunately means for doing this existed in the crania No. 4447 of the Royal College of Surgeons and No. 37783 in the British Museum. The latter, as will be seen in Table IV., is of small dimensions; but the mean of these two crania, though generally less than in 822 *a* and 822 *b*, is yet greatly in excess of No. 1232 *a* and 1232 *b* &c. The chief exceptions to this rule are, the zygomatic width, which in the form A is 703, and in the others 660; the aural width, 385 and 370; and the interorbital width, 240 and 225; the transverse diameter of the maxilla at the 3rd premolar, 410 and 390, and at the 1st premolar, 260 and 242; and the length of the incisor series, 165 and 151. In the mandible the long diameter of the condyle is rather greater in form A, and the depth under the molar considerably greater. The diasteme also is somewhat longer. But in the size of the individual teeth the preponderance is almost equally great against form A as we found it to be in the case of form B. In a cast of the mandible of *H. crocuta* in the possession of M. Lartet, taken from a specimen belonging to M. Verreaux, of Paris, I took the measure of the lower molar series, and found the numbers opposite each tooth to correspond pretty nearly, though all are somewhat bigger, with those of form B.

Having thus gone over the principal numerical differences between the various forms referred to *H. crocuta*, I would offer a few remarks on the other differences observable between them.

1. In both the crania of the form B, the infraorbital foramina are more compressed than in form A, in which these openings are larger and rounder. 2. A very remarkable difference exists in the much greater size of the tympanic bullæ in form B, in which they are rounded and inflated, and tolerably even on the lower surface, which extends downwards rather below the level of the point of the mastoid process. The same size and form exists in the cranium No. 4447 of the Royal College of Surgeons; but in No. 37783 of the British Museum, a beautiful specimen of a Wild Hyena from Natal, these bullæ are very

much less inflated, and are angular on the under surface. In all three specimens of form A the bullæ are very flat and angular. 3. In all the three instances comprehended under form A the upper tubercular molar is either entirely wanting without leaving even the trace of an alveolus, or is extremely minute; whilst in form B it has the dimensions given in the Table, and where it is wanting it has left a distinct and well-formed biradicular alveolus. Secondly, the digital fossa at the root of the upper carnassial is much shallower in the form A. The palato-maxillary suture in form A is rounded in front, and does not extend forwards beyond the level of the 4th premolar, whilst in 822*b* it forms an acute angle in front and reaches to nearly the middle of the 3rd premolar. In 822*a* this part of the palate is wanting. But in the crania No. 4447, Royal College of Surgeons, and No. 37783, British Museum, this suture is rounded as in form A; whilst again in M. Lartet's cast above referred to it is angular in front; so that I am in doubt as to the value to be placed on the form of this suture as a diagnostic mark, and merely record the facts for future consideration. With respect to the individual teeth, little can be said, on account of the very imperfect state in which the majority of them exist in the three A crania. I may observe, however, that, besides its far smaller size, the 4th premolar is remarkable, in form A, for the proportionately small size of its anterior cusp, which is merely represented by a rounded tubercle, which is so much lower than the others as to be almost untouched by wear, although the latter are much worn. And the internal tubercle is also much smaller and more rounded. I will here add what I find in Dr. Falconer's notes respecting his comparison between 1232*a* and 1232*b* and 822*a* and 822*b*. Regarding the latter as *H. brunnea*, he says of it:—

(a) The cranium is proportionally longer and higher.

(b) The cerebral case is less inflated and more compressed upwards.

(c) The sagittal crest is longer, much higher and more pronounced, and it projects further backwards beyond the condyles.

(d) The auditory bullæ are much more inflated.

(e) The facial portion is more elongated and less strangled.

(f) The infraorbital region is higher, more convex and narrower.

(g) The lower rim of the orbit is broader and more lip-like in *H. striata*. With respect to the mandible he remarks:—

(a) The horizontal ramus is less suddenly turned upwards behind.

(b) The form of the coronoid process more resembles that of *H. striata*, but its anterior edge is more reclinate than in that species.

Now, are the differences between the two forms A and B sufficient to determine their specific distinction? and if not, how are such apparently important differences to be accounted for?

I am inclined to think that the former part of this question should be answered in the negative, and that a tolerably satisfactory reply can be made to the second.

The first thing that strikes one is, that the three animals which have been taken as types of form A have all died after long confinement in menageries, into which they were probably brought when young, and, it may be, before the second dentition was completed. In all three the teeth, as a dentist would observe, are in a "shocking state," and in fact the greater part of them are either entirely wanting or in such a condition as to have been nearly unserviceable. It is quite impossible that animals in this condition could have maintained themselves in the wild state. Accompanying this condition of the teeth, the jaws will be found to present considerable evidences of morbid action, having the texture of the bone porous, and in fact in a state of interstitial atrophy; and their softened or yielding consistence may be seen, more especially in Dr. Buckland's specimen, in the abrupt expansion of the alveoli on each side of the mandible and, in less degree, of the maxilla. We can thus account for the comparatively greater width of the jaws. In like manner I think all the other differences, including even that which is observed so remarkably in the size of the tympanic bullæ, but more certainly in the degree of development of the sagittal crest and other processes for muscular attachments, may be attributed to the unnatural mode of life, and perhaps also in some degree to the preternaturally prolonged existence of the caged animals. The most difficult point to get over, as it seems to me, is the absolutely smaller size of the individual teeth. We cannot of course suppose that these would diminish in size (except by wear) after they were once fully extruded; and the only explanation I can offer of this circumstance is, that the animals may have been brought into confinement at an early age, and that the permanent teeth had become in some measure interrupted in their development, in consequence of the altered conditions in which they were placed. These considerations will at any rate serve to show how dangerous it is to rely upon conclusions drawn from the study

of animals that have long lived in an unnatural condition—a necessity which, as observed by M. de Blainville, has heretofore thrown great difficulties and, as we have reason to believe, considerable confusion upon the subject of specific distinctions in the Hyenas.

But the same observations apply with equal force to every part of the skeleton; and, speaking in the name of palæontology, it is deeply to be regretted that there are at the present time no means whatever of studying the osteology of either *Hyæna crocuta* or *Hyæna brunnea* in the wild state; and I am not even sure that any skeleton of a really wild *H. striata* is to be found in either the British Museum or the Hunterian Museum. Fortunately we have now sufficient means of studying the cranial and dental characters of the three living species; but palæontologists want more than this, and it is much to be hoped that no endeavours will be spared to procure complete skeletons also of each species in the wild state.

Explanation of Tables.

In the first four following Tables I have collected the various cranial and dental measurements which have appeared most suited to show the peculiarities, so far as dimensions are concerned, of the different species and varieties of *Hyæna*. At the bottom of these Tables the numbers relating to each particular are reduced to a mean; and in Table V. these means are placed in parallel columns, so that the differences between the different forms in each item will be seen at a glance. And in the same Table are also given the maximum and minimum measures of each part as observed by myself. Except perhaps in the case of *H. striata*, the number of instances upon which the mean dimensions are founded are not sufficient to afford perfectly reliable data; but they are sufficient for my immediate purpose, of showing, 1st, the distinctive characters between *H. striata* and *H. brunnea*, and, 2nd, the extreme diversities observable more especially between the wild and the caged specimens of *H. crocuta*. I have added a few measurements of *H. spelæa*, more to show how such results as have been obtained may be applied in the comparison of the fossil forms *inter se* and with the existing species than with any intention of including that species in the present inquiry. But I may remark that the comparison of the absolute and relative sizes of the various teeth in both jaws of *H. crocuta* (*fera*) and *H. spelæa*, though showing generally an advantage in favour of

TABLE V.—COMPARATIVE MEASUREMENTS IN DIFFERENT SPECIES OF HYÆNA.

No.		H. CRUCIATA.	H. CRUCIATA, capitata.	H. CRUCIATA, femina.	H. CRUCIATA, femina minor.	H. CRUCIATA, femina major.	H. CRUCIATA, Cast.	H. HYRAXA.	H. BUNDELA.	H. HYRAXA.	H. CRUCIATA.		H. CRUCIATA.		H. CRUCIATA.	
											Max.	Min.	Max.	Min.	Max.	Min.
1.	Extreme length of cranium...	1036	993	1069	1045	1090	.....	984	1005	1030	1120	930	1000	780	1040	935
2.	Length from occipitalis .....	.....	.....	.....	.....	.....	.....	817	895	.....	.....	.....	.....	.....	.....	.....
3.	Width, zygomatic	694	703	690	660	715	.....	590	634	740	732	645	600	610	670	600
4.	Width, aurial	384	385	387	370	395	.....	306	338	.....	395	370	325	250	345	330
5.	Width, frontal .....	.....	.....	190	.....	.....	.....	135	160	.....	.....	.....	.....	.....	160	160
6.	Width, interorbital	231	240	230	225	225	.....	181	205	260	250	280	200	165	215	190
7.	Width of condyles	200	193	195	200	200	.....	159	200	220	210	190	170	150	200	200
8.	Height of cranium .....	.....	.....	390	.....	.....	.....	.....	335	.....	.....	.....	.....	.....	365	310
9.	Height of orbit	186	175	196	180	203	.....	163	163	.....	207	170	175	149	165	160
10.	Length and breadth of nasal	230 X 120	213 X 112	242 X 126	230 X 120	250 X 130	.....	228 X 82	244 X 95	.....	217 X 112	200 X 110	200 X 95	195 X 70	166 X 100	155 X 60
11.	Length of palate	490	470	506	500	550	.....	425	468	.....	550	460	480	370	480	450
12.	Length and width of palatal	202 X 230	199 X 206	214 X 222	207 X 220	230 X 240	.....	192 X 170	143 X 182	.....	240 X 210	195 X 222	171 X 88	148 X 88	148 X 88	140 X 88
13.	Width at 3rd pm.	410	410	405	390	410	.....	308	355	.....	437	380	335	290	310	325
14.	Width at 1st pm.	260	260	254	242	260	.....	198	222	290	270	235	205	185	235	210
15.	Height of alveolus	140	133	140	126	150	.....	103	116	.....	155	115	142	60	142	130
16.	Incisor series	150	165	149	151	150	.....	127	138	.....	185	145	140	120	142	130
17.	Molar series	320	310	334	334	335	.....	271	312	370	340	300	235	250	310	305
18.	3rd incisor	50 X 40	46 X 35	52 X 40	50 X 40	60 X 40	.....	39 X 31	42 X 37	50 X 44	60 X 40	45 X 35	40 X 40	37 X 30	46 X 38	40 X 36
19.	Canine	70 X 50	58 X 41	70 X 50	76 X 49	77 X 52	.....	60 X 40	67 X 50	74 X 46	80 X 50	55 X 40	70 X 40	55 X 40	70 X 52	63 X 50
20.	1st pm.	28 X 26	25 X 23	30 X 27	30 X 25	30 X 30	.....	23 X 22	27 X 25	33 X 32	30 X 27	20 X 20	26 X 26	20 X 20	30 X 25	25 X 22
21.	2nd pm.	63 X 46	53 X 43	67 X 50	69 X 50	70 X 50	.....	62 X 40	68 X 46	68 X 43	70 X 50	50 X 40	66 X 40	60 X 40	70 X 50	66 X 45
22.	3rd pm.	87 X 67	71 X 60	94 X 70	90 X 70	100 X 70	.....	80 X 52	91 X 63	100 X 73	100 X 70	72 X 60	60 X 60	75 X 51	100 X 67	90 X 60
23.	4th pm.	140 X 77	133 X 65	146 X 84	145 X 85	150 X 85	.....	117 X 70	142 X 85	160 X 87	150 X 85	130 X 85	120 X 77	110 X 66	150 X 70	120 X 62
24.	m.	20 X 10	.....	20 X 11	.....	.....	.....	50 X 21	51 X 21	.....	20 X 11	.....	55 X 23	49 X 20	55 X 25	50 X 20
25.	Length of mandible	665	648	710	685	720	.....	611	685	.....	750	615	660	530	730	640
26.	Length of condyle	170	168	173	160	180	.....	130	170	200	190	155	145	125	170	150
27.	Height at m.	170	174	164	160	170	.....	139	163	220	185	155	165	122	170	140
28.	Width at 2nd pm.	290	303	303	300	300	.....	219	263	.....	315	291	235	210	263	240
29.	Width at diasteme .....	.....	.....	.....	.....	.....	.....	.....	150	.....	.....	.....	.....	.....	150	150
30.	Length of diasteme	39	42	37	35	45	.....	45	41	.....	45	35	50	40	50	40
31.	Length of symphysis	230	207	227	224	235	.....	191	206	.....	225	205	210	180	220	200
32.	Height of coronoid process .....	.....	.....	350	.....	.....	.....	.....	299	.....	.....	.....	.....	.....	315	283
33.	Incisor series	120	125	123	125	120	.....	120	113	.....	130	120	160	100	125	100
34.	Molar series	310	280	340	335	350	.....	268	309	352	340	260	222	250	320	300
35.	3rd incisor	32 X 30	.....	32 X 32	31 X 33	32 X 30	.....	24 X 22	26 X 26	40 X 30	35 X 35	30 X 30	25 X 25	21 X 21	30 X 25	25 X 20
36.	Canine	65 X 47	57 X 43	66 X 49	63 X 50	72 X 50	.....	54 X 41	72 X 50	71 X 52	75 X 50	55 X 40	60 X 40	50 X 40	75 X 50	70 X 50
37.	1st pm.	59 X 42	53 X 37	63 X 44	59 X 40	68 X 49	55 X 40	52 X 32	62 X 45	66 X 42	70 X 42	50 X 35	60 X 35	47 X 30	70 X 50	60 X 45
38.	2nd pm.	82 X 56	75 X 53	85 X 60	83 X 57	90 X 60	80 X 55	72 X 44	84 X 55	87 X 65	90 X 62	70 X 50	75 X 43	70 X 40	90 X 60	85 X 52
39.	3rd pm.	86 X 51	78 X 50	91 X 52	91 X 51	90 X 53	80 X 50	78 X 43	94 X 53	95 X 59	95 X 50	70 X 50	80 X 45	72 X 40	95 X 55	95 X 53
40.	m.	110 X 45	106 X 46	120 X 50	120 X 51	120 X 52	95 X 40	81 X 40	94 X 58	123 X 58	120 X 55	100 X 40	85 X 40	77 X 40	97 X 50	95 X 45
		I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	XIV.	XV.

the cave-Hyena, especially as regards the upper and lower carnassials, and in the 1st premolar, is quite confirmatory of the opinion that they are but varieties of one and the same species. But the proper comparison of the other bones of the skeleton yet remains to be made before this opinion can be regarded as fully established.

A few words are requisite in order to explain why so many columns are devoted in Table V. to *H. crocuta*.

Column I. shows the mean dimensions deduced from every specimen of *H. crocuta* that has come under my observation, taken together; and it is given in order to afford, as nearly as the amount of materials would allow, the mean of all the variations to which that species is subject.

In Column II. the figures show, as I have explained in the latter part of the paper, what I take to be the important changes induced in this species of *Hyæna* in consequence of its unnaturally prolonged existence in a state of captivity from an early period of life; and in Column III. these amounts are contrasted with those taken from the mean dimensions in all the specimens of *H. crocuta* living in a state of nature, and embracing individuals considerably differing in size, though not, as will be observed, varying from the general mean of the species in all the more fixed and important points.

In Columns IV. and V. are contrasted the extremes observed by me in what would appear to be varieties (perhaps in some cases sexual?) of the wild Hyena. And I have done this also with the view of comparing, at some future time, this diversity in the existing *H. crocuta* with the even still greater diversities exhibited in its fossil representative.

N.B.—The numbers are all given in $\frac{1}{100}$ ths of an inch, and they, of course, are readily reduced to millimetres by multiplying them by 25.4 and dividing by 100. Those numbers to which an asterisk is added have been taken from only a single specimen in each instance.

DESCRIPTION OF PLATE.

Fig. 1.—Maxillary teeth of *H. brunnea*.

Fig. 2.—Mandibular teeth of *H. brunnea*.

Fig. 3.—Vertical view of cranium of *H. brunnea* (half size).

Fig. 4.—Occipital triangle of *H. brunnea* (half size).

Fig. 5.—Occipital triangle of *H. striata* (half size).

